08-7ee

LSC Use Only No:	LSC Action-Date:	UWUCC USE Only No.	UWUCC Action-Date:	Senate Action Date:
		~~07-43ee~~	App-2/3/09	App-2/24/09

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person	Email Address
John F. Taylor	jftaylor@iup.edu
Proposing Department/Unit	Phone
Geosciences - Natural Sciences and Mathematics	724-357-4469

Check all appropriate lines and complete information as requested. Use a separate cover sheet for each course proposal and for each program proposal.

1. Course Proposals (check all that apply)

____New Course _____Course Prefix Change _____Course Deletion

__X__Course Revision __X__Course Number and/or Title Change __X__Catalog Description Change

GEOS 330 Paleontology	GEOS 353 Paleontology
***Current* Course prefix, number and full title**	***Proposed* course prefix, number and full title, if changing**

2. Additional Course Designations: check if appropriate

_____ This course is also proposed as a Liberal Studies Course.

_____ This course is also proposed as an Honors College Course.

_____ Other: (e.g., Women's Studies, Pan-African)

3. Program Proposals

_____Catalog Description Change _____Program Revision

____New Degree Program _____Program Title Change _____Other

____New Minor Program _____New Track

***Current* program name**	***Proposed* program name, if changing**

4. Approvals		**Date**
Department Curriculum Committee Chair(s)		2/4/08
Department Chair(s)		2/4/08
College Curriculum Committee Chair		2-11-08
College Dean		2-11-08
Director of Liberal Studies *		
Director of Honors College *		
Provost *		
Additional signatures as appropriate: (include title)	Joseph Domaracki TECC	1-26-09
	Mary Ann Rafoth Dean COE-ET	1-26-09
UWUCC Co-Chairs		
	Gail Sechrist	1-29-09

* where applicable

Received SEP 25 2008 Liberal Studies

Received FEB 14 2008 Liberal Studies

Part II. Description of Curricular Change

1. SYLLABUS OF RECORD

I. Catalog Description

GEOS 353 Paleontology 3c-3l-4cr

Prerequisite: Grade of C or better in GEOS 201 and GEOS 202

An introduction to the study of prehistoric life, the process and products of organic evolution, and the utility of fossils as tools for solving geological and paleobiological problems. Includes field trips which may occur on weekends.

II. Course Objectives

At the end of this course students will be able to:

1) Accurately and precisely identify a wide variety of fossils (body and trace) and know the kinds of valuable information they provide.

2) Explain organic evolution as a process, and demonstrate familiarity with the controls and mechanisms that govern it.

3) Quantitatively describe fossil specimens and utilize standard statistical methods to compare collections of fossils and derive estimates of original population statistics.

4) Critically and objectively evaluate the merit of models and mechanisms proposed to explain mass extinctions at various times in earth history.

5) Integrate information acquired from fossils with other types of data (e.g. lithologic, geochemical, etc.) to derive synergistic solutions to complex problems.

Student outcomes assessment matrix

Conceptual Framework (Danielson Domain)	Content Standard (NSTA Science Teacher Preparation)	Course Objective	Assessment (*denotes assessment for reporting)
1	1a	1	*Fossil ID exam
1, 4	1a, 1b, 2b, 2c, 4a	2	Lecture exams
1	1a, 1d, 1e	3	*Biometry exercise
1, 3	1b, 2a, 2b, 3a	4	Lecture exams
1	1a, 1d, 3a,	5	Lab exercises, lab exams

III. Course Outline

Lecture

Part A (16 academic hours): Organic evolution, fossil unicells, and simple metazoans

1. The subdisciplines of Paleontology and basics of Organic Evolution
2. The utility of Foraminifera, Radiolaria, and other fossil protists
3. Biostratigraphic and paleoecologic use of fossil mollusks
4. Sponges, corals, and other reef-builders in the fossil record
5. Structural design and functional morphology in the Bryozoa and Brachiopoda
6. Arthropoda - phylum overview, trilobite morphology and paleoecology

Exam 1 (1 academic hour)

Part B (12 academic hours): Taxonomy, Ichnology, and Biostratigraphy

1. Biometry and the paleontological species concept
2. High-level taxonomy: cladistics and supraspecific taxa
3. Ichnology: the classification and utility of trace fossils
4. Biostratigraphy I: biozones and temporal correlation
5. Biostratigraphy II: biofacies and paleobiogeography

Exam 2 (1 academic hour)

Part C (12 academic hours): Vertebrate Paleontology and Paleobotany

1. Phylum Echinodermata: our invertebrate "cousins"
2. Paleozoic vertebrate groups and other "pseudodinosaurs"
3. Dinosaurs I: Superorder Saurischia
4. Dinosaurs II: Superorder Ornitschia
5. Paleobotany: The diversity and utility of plant fossils

Final exam during final exam period.

Laboratory Exercises (3 academic hours each)

Week 1:	Classification of trilobites and other fossil arthropods
Week 2:	The fossil record of microbes (bacteria) and protists
Week 3:	Classification and functional morphology of mollusks
Week 4:	Calcareous "colonial" fossils: Porifera, Cnidaria & Bryozoa
Week 5:	Solitary lophophorates (Phylum Brachiopoda)
Week 6:	Lab Exam #1 – 1-week open book/note evaluation of selected samples
Week 7:	Ichnofossils and Ichnofacies: classification and use of trace fossils
Week 8:	Echinoderms and Chordates: the fossil record of vertebrates and their kin
Week 9:	Biometry: the quantitative characterization of morphology
Week 10:	Field Trip - Pennsylvanian marine faunas of the Conemaugh Group
Week 11:	Field Trip - Paleozoic marine communities of central Pennsylvania
Week 12:	Weekend Field Trip - Southwestern Ohio and Kentucky
Week 13:	Release time for weekend field trip to southwestern Ohio and Kentucky
Week 14:	Lab Exam #2 - 1-week open book/note evaluation of selected samples

IV. Evaluation Methods

Lecture - 3 exams (100 points each)	300 pts.
Lab write-ups and field notebook	200 pts.
Participation in lecture, lab, and field trips.	50 pts
	Total= 550 points

V. The final grade for this course will be determined using the following schedule:
A=90-100%; B=80-89%, C=70-79%, D=60-69%, F=<60%

VI. Attendance Policy

The attendance policy will conform to IUP's undergraduate course attendance policy.

VII. Required textbooks, supplemental books and readings

Hammer, O., and Harper, D. *Paleontological Data Analysis*, Boston: Blackwell Scientific Publications, 2005.

VIII. Special resource requirements

There are no special resource requirements for this course.

IX. Bibliography

In addition to the required textbook and supplemental readings from current literature, the following will be used to develop the course curriculum:

Benton, M.J (2005) *Vertebrate Paleontology*, 3rd Edition: Blackwell Scientific Publications, Oxford, 455p.

Boardman, R.S., Cheetham, A.H. and Rowell, A.J. (1987) *Fossil Invertebrates*: Blackwell Scientific Publications, Boston, 713p.

Briggs, D.E.G. and Crowther, P.R. (eds.) (2003) *Paleobiology II*: Blackwell Publishing, Oxford, UK, 583p.

Cowan, R. (2005) *History of Life*, 4th Edition: Blackwell Publishing, Oxford, 324p.

Foote, M. and Miller, A.I. (2006) *Principles of Paleontology*, 3rd Edition: W.H. Freeman Publishing, 480p.

Lipps, J.H. (1993) *Fossil prokaryotes and protists*: Blackwell Scientific Publications, Boston, 342p.

McKinney, F.K. (1991) *Exercises in invertebrate paleontology*: Blackwell Scientific Publications, Boston, 272p.

Scott, E.C. (2005) Evolution versus Creationism: an introduction: University of California Press, 212p.

Stewart, W.N. and Rothwell, G.W. (1993) *Paleobotany and the evolution of plants*: Cambridge University Press, 521p.

2. SUMMARYOF PROPOSED REVISIONS

The original format for the class was two hours of lecture and three hours of laboratory work per week for three credits (2c-3l-3cr). The new course will have three hours of lecture and three hours of laboratory work per week for four student credit hours (3c-3l-4cr). The additional hour of lecture per week reflects the overall growth of the field of paleontology since the course was originally developed. It will specifically allow for the addition of a more expansive treatment of organic evolution as a process, and more in-depth coverage of the statistical methods that have become standard tools within this discipline. In addition, the course number has been changed to conform to the Geoscience Department's new course numbering scheme.

3. JUSTIFICATION/RATIONALE

This course originally was designed as an integral component of a traditional geology undergraduate curriculum. Its primary purpose was to introduce students to the commonly fossilized marine invertebrate groups that provided field geologists with information on the ages of formations that they were mapping, and exploration geologists in the petroleum industry with the means of correlating rocks in the subsurface. The breadth of post-baccalaureate experiences for geology graduates has expanded dramatically since that time, and the field of paleontology has grown to an even greater degree. Moreover, in recent years the number of Earth and Space Science Education majors who enroll in GEOS 330 (current number) has increased to where those students commonly make up at least half of the class; the revised course GEOS 353 has been added to the required courses for the major in Earth and Space Science Education. Consequently, the course has been revised to provide the additional time needed to incorporate considerable material on vertebrate paleontology (dinosaurs in particular), the evolution of land plants, and a variety of relatively new and exciting sub-disciplines such as ichnology (the study of trace fossils), taphonomy (the study of processes of preservation), paleoecology, paleobiogeography, and biogeochemistry, to name just a few. To present this material adequately, a third lecture hour per week is necessary. Additionally, like all fields in the

geosciences, paleontology has become much more quantitative in recent years and the course has been redesigned to include numerous exercises in both class and lab to upgrade the mathematical capabilities of our future geoscientists and teachers.

4. OLD SYLLABUS OF RECORD

There is no available syllabus of record for this course. The syllabus used the last time that the course was offered (Spring 2006) is provided here. (See below).

Part III. Letters of Support or Acknowledgment

No other department or program is affected by these revisions.

PALEONTOLOGY (GEOS 330) - Spring 2006

I. Catalog Description
GEOS 330 Paleontology

2 class hours
3 lab hours
3 credit hours
(2c-3l-3cr)

Prerequisite: GEOS 131 or instructor permission

The study of the morphology, evolution, geologic significance, and paleoecology of fossil organisms. Includes field trips that may occur on weekends.

II. Course Objectives

At the end of this course students will be able to:
1) Accurately and precisely identify a wide variety of fossils and explain how they provide information of value in solving geologic problems.
2) Demonstrate a familiarity with the dramatic changes that have occurred in marine invertebrate, tetrapod (land vertebrate), and vascular (land) plant communities over the last 540 million years of earth history.
3) Quantitatively describe fossil specimens and characterize collections of fossils for analysis and comparison.
4) Critically evaluate paleogeographic reconstructions and models proposed to explain mass extinctions at various times in earth history.

II. Course Outline:

A. Lecture portion:

Date		Lecture	Topic
Jan.	17	1	Subdisciplines of paleontology
	19	2	Subdisciplines of paleontology (cont.)
	24	3	The utility of non-foraminiferan protists (diatoms, radiolarians, coccolithophorids, and palynomorphs)
	26	4	Foraminifera: biology, ecology, biostratigraphy, and paleoceanographic utility
	31	5	Species in the fossil record: Phylum Mollusca: a phylogenetic concept (phylum overvie - "minor groups" and Bivalvia
Feb.	2	6	Mollusca II - ecology and biostratigraphic use of the Gastropoda and Cephalopoda
	7	7	Sponges & spongiomorphs - a unique multicellular design: Phylum Cnidaria - an introduction to corals
	9	8	Cnidaria - morphology/ecology of corals and their kin
	14	9	Lophophorates - structural design and functional morphology in the Bryozoa and Brachiopoda
	16	10	EXAM #1 (60 points)
	21	11	Arthropoda I - phylum overview and trilobite anatomy
	23	12	Arthropoda II - ecology and functional morphology of trilobites
	28	13	Ichnology – the variety and utility of trace fossils
Mar.	2	14	Taxonomy I - procedure in taxonomy and paleontological species
	7	15	Echinoderms – a unique invertebrate phylum
	9	16	No class (release time for weekend field trip)

	14 & 16		Spring Break
	21	17	Taxonomy II - suprageneric classification and phylogeny reconstruction (phylogenetic systematics or "cladistics")
	23	18	Biostratigraphy - concepts, methods, and objectives
	28	19	Biostratigraphy (continued)
	30	20	Paleobiogeography - faunal provincialism, terrane analysis, and intercontinental correlat
Apr.	4		No classes
	6	21	EXAM #2 (65 points)
	11	22	Vertebrate paleontology I – Paleozoic vertebrates
	13	23	Vertebrate paleontology II – Pterosaurs, marine reptiles, and other "pseudodinosaurs"
	18	24	Paleobotany I - nature of the paleobotanical record
	20	25	Paleobotany II - ecology of ancient floras and paleoclimatology
	25	26	Vertebrate paleontology III – Saurischian dinosaurs: the Theropoda and Sauropodomorp
	27	27	Vertebrate paleontology IV - Ornithischian dinosaurs (Ornithopods and Thyreophorans)
May	2	28	Vertebrate paleontology V - other Ornithischian groups

FINAL EXAM - 8:00 AM Tuesday, May 9 – (75 points)

GRADING: Roughly 90-80-70-60 percentage score of 500 points possible during the semester (200 points in lecture, 300 in lab) constitutes 90%; participation accounts for the other 10%.

(36%) a) Lecture - 3 exams (dates and point values provided above); in each, you'll be asked to (1) defin 10 paleontological terms (20%) and (2) answer short essay questions on ecology, classification, evolution, stratigraphic use, and other aspects of groups discussed in lecture, described in assigr readings, and examined on field trips (80%).

(54%) b) Lab - 2 exams (open book/note/etc.), each worth 70 points (140 pts.)
- lab exercises (110 pts.)

(10%) c) Extent and quality of participation in lecture, lab, and field trips.

B. Lab portion:

DATE	LAB #	TOPIC OR ACTIVITY
Jan. 17	1	Phylum Arthropoda - classification of trilobites and other fossil arthropods (Exercise due at start of next lab)
24	2	Microbialites and microfossils - the fossil record of bacteria and other unicellular organisms (Exercise due at start of next lab)
31	3	Phylum Mollusca - classification of mollusks and functional morphology of bivalves (Exercise due at start of next lab)
Feb. 7	4	Calcareous "colonial" fossils: Porifera, Cnidaria & Bryozoa
14	5	Phylum Brachiopoda
16-28	6	**EXAM #1:** "Take-home exercise" - (due at start of lab 2/28)
28	7	Ichnofossils – Trace fossils and their utility (Exercise due at start of next lab)
Mar. 7	8	Echinoderms and Chordates (Exercise due at start of next lab)
14		SPRING BREAK
21	9	Biometrics Exercise (due at end of day, Friday March 31)
Mar 25-26		**WEEKEND FIELD TRIP**: Paleozoic of Ohio & northern Kentucky (Apr. 1-2 as bad-weather back-up)
28	10	Open lab for poster preparation (due end of day, Friday April 21)
Apr. 4		No classes
April 9		**SUNDAY FIELD TRIP**: Paleozoic marine communities, central PA
11	12	Graptolites and conodonts
18	13	Kingdom Plantae - the paleobotanical record
.Apr 21-May 5		**EXAM #2**: (due end of day, Friday May 5)
25	14	**"In Lab" Field Trip**** - Late Paleozoic (Pennsylvanian) marine faunas of the Conemaugh Group – paleoecology and taphonomy.

*Sunday (Apr. 9) field trip leaves from 106 Walsh Hall at 7:00 AM - will return after dark - pack a lunch or plan on "fast-food" stop(s).

**"in lab" field trip will leave from 106 Walsh at 2:15 and return at 5:45.